Procedure for establishing a communication across a computer network of the INTERNET type, between two information-transmitting devices.

A computer network of the INTERNET type is well suited to the exchange of data between a computer terminal and a server dialled up by the latter by means of the address of the server in the network.

As there are a large number of terminals, it is not possible to allocate to each of them a definitive address, so that each of them has an address assigned to it, temporary and variable from one call to the next, only when it initiates a call, that address being communicated to the server for response purposes.

Thus, the number of addresses remains limited to the number of permanent addresses, those of the servers, and the temporary addresses of active machines in the process of calling.

For this reason, terminals at rest cannot be located and therefore dialled up, since they are unknown to the network through lack of address. In particular, it is not possible to establish direct telephone communication over the INTERNET, to transmit information, such as voice or data.

The present invention aims to solve this problem of access to a terminal or any other information-transmitting device.

To this end, the invention concerns a process for establishing a communication, on a first, computer network of the INTERNET type, between two devices on this first, computer network and on a second, telephone network, in which:

- one of the two calling devices calls the other on the second, telephone network to invite it into the said communication by giving it the references of a message accessible on the computer network,

- the calling device connects itself to the first, computer network, receives an IP1 computer address and incorporates it into the aforesaid message, and

- the device called connects itself to the first, computer network, accesses the aforesaid message, obtains the IP1 computer address of the device calling and establishes the aforesaid communication.

The term 'message' is used here to mean any body of information which can be

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transmitted across the computer network, whatever the presentation of this information, which may therefore in particular represent alphanumerical characters as well as fax type images.

The message, still accessible via the computer network, has the function of a site representing the calling device, the references transmitted by the invitation to make communication sent by the latter being in fact a link in order to access the message. The telephone network serves as a signalling network for the computer network, in order to transmit that link, and thus makes it possible to demand that a device, temporarily disconnected from the computer network, connects itself to the network deliberately, when another device wishes to enter into communication with it via the computer network.

It is of advantage for the calling device to transmit a secret code word, which the latter subsequently retransmits, via the first, computer network, to the calling device so that the latter agrees to enter into communication.

In this way, protection is assured against any attempt to substitute the called correspondent, following computer hacking.

The invention will be better understood with the aid of the following description of a preferred mode of implementation of the process of the invention, with reference to the single appended drawing, which is a diagrammatic representation of information-transmitting terminals connected to the switched telephone network STN, and to the INTERNET, in which there are two INTERNET service providers.

In the figure, two information-transmitting terminals 1 and 2 are represented which, in addition to the classic circuits for a data link with the INTERNET network 3, via telephone lines 14, 24 respectively, also have in this example a microphone and a loudspeaker and circuits allowing vocal communication to be established. This vocal communication may here be established via the switched telephone network 4, with digital conversion upon entering the network 4 and reconversion to analogue upon exit from the network 4. If the network 4 was an integrated services fully digital network (ISDN), terminals 1 and 2 would themselves ensure the above conversions by codecs. In addition, terminals 1, 2 can exchange between themselves, across the INTERNET 3, packets of digital, coded vocal signals in compression, which are decompressed and decoded upon reception to be restored on the loudspeaker or a receiver.

The INTERNET 3 has two providers of access 31, 32 to the INTERNET, also connected to the STN 4, to which the users of terminals 1 and 2 are respectively

subscribed, these users being able (broken lines) to reach their respective service providers 31, 32 via their lines 14, 24 of the STN 4. The INTERNET link 33 connecting the two service providers 31, 32 illustrates a classic temporary link on the INTERNET 3 allowing terminals 1 and 2 to be connected together by means of their lines 14 and 24. In practice, there are many such terminals.

The software architecture of terminals 1 and 2 is inspired by the recommendation H 323 of the ITU with, at the top of level 7 in the OSI (Open Systems Interconnection) classification, an application relating here to telephony across the INTERNET 3.

Below, and up to a command circuit for a data exchange modem, are two channels for data processing OSI layers, one for signalling and the other for useful data, in this case vocal signals in the form of packets.

The service provider 31 has a memory 311 which it places at the disposal of terminal 1, with respect to its writing, memory 311 which is accessible for reading purposes from any device on the INTERNET 3, providing that device supplies the memory address information necessary to retrieve a specific electronic document from the memory 311.

Terminal 1 thus has available, through the intermediary of the service provider 31, a section of the memory 311 which is the functional equivalent of an INTERNET site, and which can therefore be consulted by any other terminal.

In a general way, the memory 311 may be installed in any location whatever, perhaps remote from the service provider 31, to the extent that the latter serves as intermediary designed to allow access to that memory 311. The latter could therefore be situated in a computer centre, or even with another service provider, with the service provider 31 establishing an INTERNET link, for instance, when access to the memory 311 is required.

The process of establishing a communication between terminals 1 and 2 will now be explained.

Generally, the establishment of a communication, on the first, computer network 3 of INTERNET type, between two devices, here the terminals 1 and 2 of this first, computer network 3 and of the second, telephone network 4, involves the following steps:

> one of the two calling devices 1 dials up the other 2 on the second, telephone network 4 to invite it into the said communication by giving it the references of

a message accessible on the computer network 3,

the calling device 1 connects itself to the first, computer network 3, receives an IP1 computer address and incorporates it into the aforesaid message, and

the called device, 2, connects itself to the first, computer network 3, accesses the aforesaid message, obtains the IP1 computer address of the calling device 1 and establishes the aforesaid communication.

The above process thus avoids the necessity of a rendez-vous or communication server, by inviting terminal 2 to consult the message at the memory-site 311 containing the up-to-date IP1 address.

The IP31 or URL address information of the access provider 31 may be a classic INTERNET address or simply a reference allowing the latter to be retrieved, for instance the name of the service provider, in order to access the message, to write it and to read it, via that provider.

In that example, terminal 1 composes the electronic mail in the form of at least one HTML page on which is included a marker specifying the position of the IP1 computer address on the page. In that example, it is a question of a command character, invisible on a screen.

In order to avoid establishing a communication via the INTERNET 3 between two terminals 1 and 2 which would not be compatible, at the time of the call via the telephone network 4 the two terminals 1 and 2 exchange signals verifying their compatibility for communication across the INTERNET 3. For this purpose, the CCITT Q931 protocol is used here. A secret code word is transmitted by terminal 1 to terminal 2, which the latter subsequently retransmits, via the INTERNET 3, to terminal 1 so that the latter agrees to enter into communication.

In addition, the signals contain an identifier N1 for the terminal 1 calling via the telephone network 4, which allows terminal 2, or its user reading these signals on a terminal 2 display, perhaps to refuse to establish the sought for INTERNET communication. The identifier is, for instance, the telephone number N1 of terminal 1, issued by the CLASS service of the telephone network 4.

In particular, it can be arranged that terminals 1 and 2 automatically establish communication between each other and each then activates warning mechanisms such as a bell or indicator light, to inform the users of devices 1 and 2.

In even greater detail, in this example terminal 1, calling terminal 2 via the STN 4, issues a signal CNGa at 1300 Hz which terminal 2 recognises, here without activating its bell, and it replies by continuous emission of a signal at 1300 Hz followed by a V21 identification frame containing a terminal 2 identifier, such as the serial number and manufacturer. Terminal 1 replies with an NSC frame which contains an identifier for terminal 1, the IP31 computer address of the server 31, the name of a directory and an HTML page file name together with the secret authentication code. Terminal 2 executes acceptance of this data by emitting a DCN frame and the two terminals 1, 2 "hang up" to free their lines 14, 24.

Terminal 1 calls its service provider 31 and edits an HTML page, with the name XX of the directory and a name YY of the file for the message of the page and the IP1 computer address which it has obtained from the service provider 31, and sends the HTML message to the provider 31 who places it in the memory 311 in a section specified by the name XX of the directory above, transmitted to terminal 1.

It will be noted that the telephone call from terminal 1 to terminal 2 may take place after dispatch of the HTML page to the service provider 31, but it is also possible for the calling terminal 1 to dial up the other terminal 2 first of all on the second, telephone network 4, prior to connecting itself to the first telephone network, INTERNET 3, providing there is no risk of terminal 2 calling the service provider 31 too quickly since it does not yet have the HTML page, or if it is not up to date with respect to the IP1 address. In a particular instance, terminal 1 may however have instructed terminal 2 not to call until after a delay or a specified time.

In practice, the message on the HTML page may be retained permanently in the memory 311 and the service provider simply updates the IP1 address, perhaps automatically, each time it provides a new IP1 address to terminal 1 which calls it.

The service provider 32 here has a classic rôle, in contrast to the service provider 31. Terminal 2 calls the latter using the INTERNET 3, via its service provider 32 and sends it the IP31 address to establish a link such as that bearing the reference 33. Once the service provider 31 has been reached by terminal 2, the latter sends it the memory address information or reference (name XX of the directory and name YY of the file) previously received from terminal 1 via the STN 4 for reading access to the HTML page deposited in the memory 311 by terminal 1. The message reference transmitted from terminal 1 to terminal 2 may simply indicate a message, the address of which is already known to terminal 2.

When terminal 2 then calls terminal 1, that amounts in fact simply to extending the link 33, already established with the service provider 31, to line 14. Terminal 2 then sends its address IP2 to terminal 1. In practice, as the service provider 31 has already received this computer address IP2 from terminal 2 to communicate with the latter, that amounts to ordering the server 31 to communicate the IP2 address to terminal 1. This command may originate from terminal 2 or from terminal 1, perhaps by the sole fact of the service provider 31 being called by one or other of terminals 1, 2. Terminal 2 at least then has at its disposal in all cases the IP1 computer address of the other terminal 1 and may therefore communicate with it. Terminal 2 then sends to the IP1 address a SETUP signal with its IP2 address and the secret code word to authenticate its identity. Terminal 1 in return sends a CONNECT connecting signal if it recognises the authentication code word and terminal 2 replies with a CONNECT-ACK signal of agreement, followed by an exchange of packets of useful data, such as voice or computer data such as faxes, or electronic mail.